# *Hyperion NET & DUO Series 3 Chargers - User Manual*

*v4.6+ firmware versions. Visit http://media.hyperion.hk/dn/eos for the newest manuals, firmware, and EOS SUITE PC software*

**Warnings:**

EOS chargers are carefully designed with many built-in safety features, such as reverse polarity protection, input voltage error warning, and cell-count mismatch warnings for lithium chemistry batteries. HOWEVER, IT IS THE RESPONSIBILITY OF THE USER TO INSURE THAT THE CHARGER IS CONFIGURED AND USED IN A SAFE MANNER IN PROPER ENVIRONMENT.

**CAUTIONS**

- Always be sure that the charger is properly configured for the correct battery type. **ALWAYS** power charger ON **before you attach a battery to output or balance connectors**.
- **Be SURE** that your lithium battery pack balance connector matches the multi-adapter type connected to the charger.
- SYNC MODE charging should start with packs at near equal discharge states (see more details in text)
- Be sure that the batteries you charge are capable of charging at the current (A) rate you select
- Never charge batteries unattended
- Charge only in a fire-resistant environment, non-flammable surfaces such as on concrete or brick
- Do not charge near easily flammable materials
- Do not charge batteries inside a model
- Charging outdoors is strongly recommended
- Use only high-quality gold 4mm bullet connectors for charge output cable connection to the charger. See "setup"
- Properly insulate and regularly inspect all connectors to eliminate the possibility of short circuit. Damage caused by output short circuit is not covered by warranty.
- Never allow the charger case to contact an AC/DC power supply case while powered
- Do not drop or cause other shock to the charger, nor subject it to moisture, condensation or liquids
- Do not attempt to charge battery packs made from different types of cells, a mixture of old and new cells, or cells made with chemistry not supported by the EOS charger
- NEVER attempt to charge "non-rechargeable" cells
- Do not open the case of the charger under any circumstances. Doing so will void the warranty
- Keep the charger away from children or pets at all times.
- **NEVER ATTEMPT TO CHARGE A SINGLE BATTERY ACROSS BOTH PORTS of a DUO charger or 2x NET chargers.** (example: a "single unit" 10S pack) DOING SO WILL DAMAGE THE CHARGER, BATTERY, AND WILL VOID YOUR WARRANTY.

**PUT SAFETY AHEAD OF ALL OTHER CONSIDERATIONS!**
**HIGH RISK CHARGING ADVISORY**
Avoid charging batteries indoors. If you must charge indoors, or any place injury or damage to property could occur in the event of fire, then be sure to:
* Keep battery well away from flammables (2 meters or more)
* Contain battery in a heavy fireproof container (such as a brick box)
* Always monitor the charge

**Specifications & Features:**

- Built -in Hyperion LBA10/300 Balancers with 300mA max balance rate per cell
- **12-bit** Resolution Balance Circuits for max accuracy
- **STORE MODE** for LiPo, LiFe, and LiIo allows fast and simple charge/discharge to 60%~70% capacity for proper storage of Lithium Batteries = long battery life
- **CYCLE MODE** for Lipo, Life, LiIo, NiCd, and NiMH
- Built-In **DISCHARGE** function
- **TCS** - Terminal Capacity Selection during charge to speed charge and/or increase battery Cycle Life
- **TVC** – Terminal Voltage Control for LiPo, LiFe, and PB
- **Rich Data Displays** via LCD display during and after charging and balancing
- **USB** PC Port for Firmware upgrades, and **PC Control & Data Suite** Software System, which allows full control of the charger via PC, Data Logging, Memory Management, and more.
- **Temperature Sensor** Ports & Temp Stop settings*
- **Power Supply Amperage Control** to allow reliable charging with lower-output power supplies
- **Power Supply Voltage Control** works in concert with Amperage control to insure the charger does not overload your variable power supply
- **Adjustable Power Sharing** % between Outputs (DUO) when low-output power supply is in use.
- Input Cable with 4mm Male **Connectors + Clamps**
- **Output Cable Set**(s) Included, with 4mm Connectors
- Integral, Thermostat-Controlled Cooling Fans
- 16-Character, Yellow Backlit LCD Data Display(s). Highly visible in all conditions
- **20 User-definable Memory Positions** per port (40 total for DUO series). Unlimited Storage and upload of memory sets via EOS SUITE software.

* Temp sensors available separate: #HP-EOSTMPSEN
** Firmware upgrades only available if/when improvements are identified in future.

**HYPERION ACCEPTS NO RESPONSIBILITY FOR DAMAGE OR INJURY FOR INDOOR or other HIGH RISK CHARGING ACTIVITY**

| | 0720i-NET3-AD | 0720i-NET3 | 0615i-DUO3 | 1420i-NET3 | EOS0720i-SDUO3 |
|---|---|---|---|---|---|
| Charger Output Ports | 1 | 1 | 2 | 1 | 2 |
| Max Watts Output per port w/DC Input | 150 | 250 | 180 (360 total) | 550 | 500 (1000 total) |
| Max Watts Output per port w/AC Input | 90 | n/a | n/a | n/a | n/a |
| DC Input required for max watts output | 13.5V+ | 14.5V+ | 14.5V+ | 24V+ | 24V+ |
| Max Current Output (A) per port | 20 | 20 | 15 | 20 | 20 |
| Discharge Watts Limit per port | 50 | 80 | 50 | 80 | 40 |
| Discharge Current (A) Limit per port | 5 | 10 | 10 | 10 | 5 |
| DC Input Voltage Range | 10.5V~15.0V | 10.5V~29.0V | 10.5V~29.0V | 10.5V~29.0V | 10.5V~29.0V |
| AC>DC PS for Max Watts Output | n/a [1] | 14.5V+, 340W+ | 14.5V+, 480W+ | 24V+, 700W+ | 24V+, 1300W+ |
| Lead-Acid DC Input Suggested | 12V Deep-Cycle | 24V Deep-Cycle | 24V Deep-Cycle | 24V Deep-Cycle | 24V Deep-Cycle |
| Max Lipo/LiFe/LiIo "S" per port | 7 | 7 | 6 | 14 | 7 |
| Max Lipo/LiFe/LiIo "S" via SYNC MODE [2] | 14 | 14 | 12 | 28 | 14 |
| Max PB (lead-acid) Cells per port | 12 | 12 | 12 | 12 | 12 |
| Max NiCd/NiMH Cells per port | 16 | 16 | 16 | 16 | 16 |
| Built-In USB with included cable | yes | yes | yes | yes | yes |
| Charger Control/Editing via PC Software | EOS Suite | EOS Suite | EOS Suite | EOS Suite | EOS Suite |
| Charge Logging/Tagging via Software | EOS Suite | EOS Suite | EOS Suite | EOS Suite | EOS Suite |
| Firmware Upgradable | yes | yes | yes | yes | yes |
| Temp Sensor Port (sensor is option) | yes | yes | yes | yes | yes |

1 - Net3-AD has internal AC power supply, or can be connected to DC supply instead (but not both together!). All others are DC-input only.
2 – All DUO series chargers are already internally networked for SYNC of two packs. All NET chargers can SYNC by connecting two of the same series NET chargers together, with option cable# HP-EOS0610-MSC. For large flight packs, SYNC MODE balance charging of two SEPARATED (split) packs can be used. After charging, the split packs are series-wired to make the flight pack, like 8S, 9S, 10S, etc…
(so 2x2S=4S up to 2x14S=28S series-wired flight packs are possible, depending on specs of the EOS charger(s) used to SYNC charge)

## *GENERAL SETUP and NOTES*

**The EOS NET/DUO** come with male 4mm Bullet connectors (aka 'banana plugs') attached to the power INPUT cables. These cables are appropriate for attaching directly to most high-quality AC-DC power supply units, such as the BK Precision (USA) model 1692(15V, 40A, 600W). Also included are large Terminal Clips with matching 4mm female bullet connectors, for attaching directly to 12V~24V lead-acid batteries.

**Output side 4mm** Male Connector + Cable assemblies (#HP-EOSOUTCORD) are also supplied. Carefully solder your preferred battery connector to the free ends, with correct Red (+) / Black (-) Polarity. If you make additional output cables, note that MINIMUM inner cable diameter should be 2.5mm (14ga) and MAXIMUM cable length is 30cm (12").

**It is critically important** that you use either a fully charged lead-acid automobile INPUT battery (or better, deep-cycle marine battery) - or a high quality AC-DC power supply. See specs table page #1 for recommended AC>DC power supplies. When charging high voltage batteries at high current the Power supply should meet or exceed our recommendations. Note that PS load control features DO allow you to use lower-rated power supplies reliably, but that total charger output wattage will be limited accordingly. (See details later in this manual).

**If you have any trouble** charging after confirming that input and output cables are properly connected and of the proper materials, be sure to check the charger on an automotive battery. Many problems are associated with poor quality or inadequate switching AC-DC power supplies. Use PS Load control as needed to reduce load on your PS, or upgrade your PS.

**If, after carefully reading** the following pages on usage, you have any difficulty using the charger please refer to the troubleshooting guide and warranty terms at the end of these instructions. It is best to carefully check your charger before making a return, as problems in setup, cabling, or power supply are much more common than defects in the charger. Chargers returned by the user and later found not defective will only be returned to the user at the user's expense and may incur a service charge.

***ALWAYS power charger ON before you attach a battery to output or balance connectors!!***

### *Memory Positions for Charging, and Settings per Battery Type*

Twenty *MEMORY* positions on Each Channel allow you to set and store parameters for CHARGING your packs, such as BATTERY TYPE [NiMH, NiCd, LiPo, LiIon (LiIo), LiFePO4 (LiFe), Lead-Acid], battery CAPACITY, Charge RATE, Cutoff Voltage, Temperature, etc.

## *BATTERY CHARGING - Let's try it once to learn it….*

(Example: LiPo battery with balance connector. Follow the flow charts as you go…)

**MODE:** *Before Charging/Discharging is started:* Scrolls between MENUS for MEMORY (Charging), USER SETUP, DATA VIEW, BALANCER.
MODE also selects SOLO and SYNC modes for charging packs greater than 6S
**MODE:** *During Charging/Discharging:* Scrolls between VIEW MODES: MEMORY, DATA VIEW, And DATA QUICK VIEW screens.
**UP/DOWN:** Scroll through the settings within Menus, Data Views, and Selects values for Settings
**ENTER:** Selects any Setting to CHANGE / Charge START / Charge STOP
**CH:** (not pictured left) Selects which screen you are reading: Port #1 or Port #2.

Attach the charger to an appropriate DC power supply (or wall power if NET ACDC). Connect the Output Cable 4mm bullet connectors to the Red (+) and Black (-) CH#1 output port on left side of the charger. Connect your Battery Main Connector to the Mating Connector you have previously soldered to the Output Cable set. Connect your **Lithium Polymer battery** Balance Connector to the EOS Balance Multi-Adapter. ALWAYS USE THE BALANCER(s) WHEN CHARGING LITHIUM BASED PACKS FOR SAFETY!!
(See end of these instructions for more information and balance multi-adapters for various brand lithium packs).

**Note:** Always connect the Output **Cable set to charger first, then power CHARGER ON**, then connect Battery MAIN Wires, **then Battery BALANCE adapter. Never connect a pack to a charger which is powered OFF.** After charging is finished, always disconnect the Battery main wire connectors from Output Cable set first; then disconnect Output Cable set from charger.

After the Welcome screen, the charger will start and display the most recently used memory position.
(see flowchart (2) MEMORY DISPLAY at this time)

Press **CH** to select which charger or port screen you are reading, '1 or 2' will be shown in the top, right-hand corner
Pressing **ENTER** once will make the Memory Position start flashing. Flashing values can be changed with **UP** / **DOWN** keys.
While Mem Position is flashing, Press **DOWN** to scroll through the ten available memory positions.
Press **ENTER** again to confirm the memory position that you wish to use.
From the memory screen, now press **DOWN** to get to *BATT TYPE*, press **ENTER** to start *BATT TYPE* flashing for selection.
Press **DOWN** until you see your desired Battery Type (LiPo in this case). Press **ENTER** to confirm.
Press **DOWN** again to select Pack Voltage which matches your battery

**Note:** the Charger shows both pack voltage and the number of cells in Series (S) on this screen, matching the Voltage and Battery Type you have selected. If the "S" and the Voltage **don't** match your battery, you have the **Wrong Battery Type** selected (like confusing LiIon 3.6v with LiPo 3.7v types). Use **UP** key to reach *BATT TYPE* again, and reset *BATT TYPE* properly.

Press **DOWN** to get to *BATT CAPACITY*; press **ENTER** to make the mAh value flash and adjust with the **UP** or **DOWN** buttons until it matches your battery, by increments of 100mAh (to max of 50,000mAh). Press **ENTER** to confirm.
**If your battery is 730mAh**, for example, you could set this to 700mAh. The common CHARGE RATE (set in next screen) for lithium is 1C of capacity (equal to 0.7A for a 700mAh setting).

Press **DOWN** to get to *CHG CURRENT*. Max allowed charge rate for Lithium Polymer (LiPo 3.7v/cell) is 2C default, but selectable in USER SETUP, LIPO MAX C setting (1C~5C). ***CAUTION!*** For other cell types, there is no restriction, up to the max amps limit of the charger, so BE SURE you know what *CHG CURRENT* setting to use for your battery (see also below text on cell types).

Press **DOWN** to *TEMPERATURE CUT-OFF*. Requires option part #HP-EOSTMPSEN, temp sensor. This is most often used by advanced users for NiMH charging. The Default setting is 50 degrees Celsius.

Press **DOWN** to *SAFETY TIMER* - Adjustable between 20 and 300 minutes. An alarm will sound during charging after selected time interval during charging has elapsed. Set the time for about 30% longer than it should take your pack to charge. Keep in mind that a badly balanced pack may take longer than normal to charge, so don't set this too tight. A Lipo pack at 1C rate might take as much as 120 minutes to charge, so timer of about 160~180 minutes may be appropriate. Note that while other safety checks based on capacity and voltage are also working for you, charging should never be left unattended in any case.

Press **DOWN** to *TCS CAPACITY* – For LiPo and LiIon battery types Terminal Capacity Selection is available from 50% to 100% of pack capacity. During the charge, the charger will continually estimate capacity in the pack, and either terminate the charge or sound a signal tone (and continue charging) when your selected TCS percentage is reached, depending on the value for you set for *TCS END ACTION*. See end of manual for more details on TCS.

Press **DOWN** to *TCS END ACTION* – Values are CONTINUE and STOP. CONTINUE is the default. In this case, when TCS% is reached for settings 50% to 95%, the charger will "beep" 10 times, but continue charging to 100% until stopped. If TCS ACTION is set to STOP, the charger will stop charging at that TCS setting and - if balancing is complete – then give COMPLETE (END) Buzzer according to you buzzer settings. (or continue till balanced, then give End buzzer).

Press **DOWN** to *TVC = YOUR RISK!* **NEVER** change this from default 0mV setting, unless you have CAREFULLY read and understood the information on TVC function given on pages 5&6, AND FULLY ACCEPT ANY CONSEQUENCES AND ALL RISKS!

Press **DOWN** to *DSCH CURRENT* – If you'll be discharging, you'll set the discharge current here. Note that depending on the voltage of the pack, the current you set may not be obtainable if the total Volts multiplied by Current (A) exceeds 50W.

Press **DOWN** to *DSCH VOLTAGE* per cell – Lithium types should only be discharged for storage, so we recommend that you use STORE MODE for that. Otherwise, you need to be sure of the V/cell setting yourself, according to your battery type. Over-discharge can damage packs.

Pressing **DOWN** for a last time returns you to the 'Memory Select' screen.

At this point, see flowchart **(7) LiIo / LiPo / LIFE BATTERY START**. Holding the **ENTER** key pressed down for two seconds or more will start the CHARGE, STORE, DISCHARGE, or CYCLE process (select desired with UP/DOWN Keys) for LiPo, LiIon, and LIFE types, no matter where in the MEMORY (CHARGE) screens you may be. Additionally- if balancer circuit is connected – SYNC MODE is available via ENTER (short push) and UP/DOWN arrow keys.

With "CHARGE START SOLO MODE" selected, hold down **ENTER** for 2 seconds. Hold down **ENTER** again, the charger will then read **BATTERY CHECK** and then ask you to confirm the number of cells in your battery pack. Press **ENTER** (short press) for a final time to start charging. (if balancer is connected, a 10-second countdown occurs, then auto start). If TVC Function is set to anything other than the default 0mV, the TVC setting will show on the screen for a few seconds before charging begins. IF the TVC setting is NOT as you wish (default STRONGLY SUGGESTED), STOP and reset TVC, then begin charge again!
(see pages 5&6 for full details on TVC function)

**Note:** If the Lithium-based pack is NOT connected to the balancer port, the Charger will read NO BALANCER.

Holding down **ENTER** (2 seconds) at any time while charging a battery will then **STOP** charging (or discharging, etc…).

## *MODE SELECTIONS*

**Before** Charging/Discharging/Store are in progress, Pressing the MODE button will scroll you through the MEMORY, DATA VIEW, BALANCER and USER SETUP screens, allowing you to change parameters as you like (see charts for each)

**During** Charging/Discharging/Store , Pressing the MODE button will scroll you through the MEMORY, BALANCER and QUICK VIEW Data screens. (see chart *(9) OPERATION and FINISH DISPLAY*)

* MEMORY – Short-press **UP**/**DOWN** buttons to scroll through the data presented. At the top memory screen (showing C: A), you can press **ENTER** and **UP**/**DOWN** to change charge current if desired. You can also LONG-press (2-seconds) **UP** button to see each screen presented in turn at two-second intervals.

* BALANCER – **UP**/**DOWN** buttons to see detailed information on cell balancing, and individual cell voltages

* QUICK VIEW – Shows the following useful info on a single screen:
  CAPACITY mAh/Ah (Charged in "C" or Discharged out "D")
  INPUT VOLTAGE (Vi)
  PACK VOLTAGE (V)
  CHARGE CURRENT (A)
  CAPACITY (%) of the pack at current time.

***---- DATA VIEW***
Press the **MODE** button until you reach the *DATA VIEW* screen. (see chart (3) Data View Display)
Use the **UP** or **DOWN** key to scroll through the various information presented:
**INPUT* – Current input voltage from the power supply
**OUTPUT* – The output voltage of charger while charging, or pack voltage of the battery while connected but not charging
**BAT. RES* – The internal resistance (IR) of the battery pack in mΩ. (Most accurate near charge END. Temp affects readings)
**TEMP* and *PEAK TEMP* – Current Temp, and Peak Temp recorded during the charge (requires optional temp sensor)
**CHARGE TIME*, *CHARGE CURRENT*
**PEAK CHARGE VOLTAGE*
*(see chart for other information screens available under Data View)*

***---- BALANCER MODE (Lithium types only)***

Try it out with a LITHIUM battery pack which has the proper Balance Connector attached. Attach the charger to an appropriate DC power supply, and connect your battery pack's main and balance connectors to charger as previously described.

Press the **MODE** button until you reach the *BALANCER* Mode screen.

*Press **DOWN** once to reach the SELECT VOLTAGE screen. This screen simply shows you a very accurate voltage for each cell in the pack, in turn. You will see [1CL] at upper right, and a voltage displayed below, to three decimal places; for example: 3.982.
*Press **ENTER** to make the [1CL] flash, and **UP** to see the voltage for the second cell, third cell, etc…
*When you have seen the voltage for the last cell in the pack, press **DOWN** to reach the next screen:
*AVG. V* shows the **average** voltage per cell, across the whole pack.
*V. GAP* shows the **difference** between the highest and lowest volt cells in the pack
*Press the **DOWN** button to reach the next screen, which shows voltage for every cell in the pack to two decimal places (x.xxV).

Press **ENTER** for two seconds. You will see *BALANCE START / SOLO MODE* - SYNC MODE
--- **If you are using a single port only. Use UP or DOWN to select SOLO MODE.** Hold down the **ENTER** button, the charger will check the battery, and then ask you to confirm the number of cells in the pack. If correct, press ENTER once to start balance charging.
--- **If you are using DUO or 2x NET together**, and want to balance two packs (of same type and capacity,) as a single unit – such as 4S VX4000 and 5S VX4000 to make a 9S series-connected flight pack –hold down the **ENTER** and **DOWN** key to change from SOLO MODE to SYNC MODE. Hold down the **ENTER** to start *BATTERY CHECK*. The number of cells in each pack will be shown one above the other. If both are correct, press **ENTER** to begin balancing.

After Balancing has begun, you may return (using UP or DOWN keys) to the screen which shows all cell voltages together. Cells which are **higher** in voltage will show the decimal point alternating to a larger square shape, indicating that these cells are being discharged, while the lower voltage cells are not. Hold down the **ENTER** to stop balancing at any time.

**NOTE!!** SYNC MODE Charging (selected in similar way to SYNC BALANCING above) is intended to be used only with two packs of the same brand, capacity, type, and lifecycle history! For example, two packs of CX5000 4S lithium polymer purchased at the same time and used together as a 8S flight pack in series when flying a particular model. At the start of SYNC MODE charging, both packs should be at roughly the same discharge state. Otherwise, you should SOLO MODE charge each pack separately, and when both are done use SYNC MODE balancing before connecting in series for flight.

***---- USER SETUP*** (these settings are "sticky" until you change them again)

Press the **MODE** button until you reach the *USER SETUP* - TEMP MODE screen.
* Press **ENTER** and use **UP** or **DOWN** keys to select temperature display in degrees Fahrenheit or Celsius

Press **DOWN** to scroll through the following screens, and **ENTER** then **UP** or **DOWN** to change settings on each screen:
* *BUTTON SOUND* screen - ON or OFF
* *FINISH SOUND TIME* screen - OFF, ON (continuous), 1 Minute, 15 Seconds, 5 Seconds
* *FINISH SOUND MELODY* screen – Choices 1 to 10 (Will also play each Melody)
* LIPO MAX C screen – Choices of 1C to 5C in 1C steps, 2C Default. Allows limiting max LiPo charge C-rate as you desire.
* *POWER SUPPLY VOLTAGE* screen – Set to limit max watts INPUT (primary for variable voltage PS units only)
* *POWER SUPPLY CURRENT* screen – Set at the rated CURRENT (A) of your power source [set to 40A if car battery]
* *POWER SHARING screen* - Set the shared power percentage for the two battery outputs (details below)

Power Supply Voltage and Current together comprise PS Load Control. The EOS NET & DUO series are extremely powerful chargers, and can – particularly when charging high-voltage packs at high rate settings - pull more amperage than many power supplies can deliver. To avoid stressing your PS and having charges terminated prematurely, you can tell the charger the rating of your supply, to limit the load on the supply. If you find the PS is still overloaded, reduce the setting for POWER *SUPPLY CURRENT* until the problem goes away (or buy a stronger Power Supply unit!).
* You have a fixed Voltage AC/DC PS with 20A rating: Set *PS CURRENT* to 20A (or less).
* You have an AC/DC PS with variable voltage from 12V-18V, and 300W limit: Set your Supply to 18V, set *PS VOLTAGE* to 18V, set *PS CURRENT* to 300W/18= ~16A (or less).

## *BATTERY CHARGING - EXTENDED DETAIL*

Consult the documentation or labels provided with your battery to determine the correct capacity setting. It is very important to get this right, as the charger uses the capacity setting to determine nominal charge rate (amperage), TCS percentage, and safety termination. Incorrect settings could damage the battery, and could even cause an accident.

----- **For Lithium types CAPACITY is selected in mAh**. Selection is in increments of 100mAh. **CURRENT** is set in Ampere (at *CHG CURRENT* screen), so divide mAh by 1000 to get Amperage. For 700mAh, current is 0.7A for 1C, up to 1.4A for 2C etc. For an 1800mAh pack then, 1.8A for 1C, and 3.6A for 2C and so on.

----- **Lithium Polymer (3.7v) vs. Lithium Ion (3.6v)** Please make absolutely sure that you properly identify the type of lithium battery you are charging, the capacity in mAh, and the number of cells wired in series and the pack voltage! Lithium Ion (3.6v nominal) should never exceed 1C charge rate. **Never** charge **Li Ion 3.6V** types by LIPO 3.7V charger mode!

**----- LiFePO4 Cells: (a123, etc)** The LiFePO4 charge/discharge modes are intended for cells with 3.3V nominal produced by A123 Company, Hyperion, or other-brand LiFePO4 cells which are recognized to be of good quality from well-known makers. In *MEMORY MODE*, choose LIFE for *BATT TYPE*, for charging such cells. The LIFE charge mode MAY work with "no-name brand" LiFePO4 cells having 3.3V nominal voltage, but Hyperion has found some "knock off" cells in the market of very questionable quality. Customers who use LIFE mode (LiFePO4 mode) to charge such off-brand cells assume all risk.

**LiFePO4 (LIFE) CHG CURRENT (A) setting:** The EOS NET/DUO does NOT limit max charge rate for LiFePO4 based on capacity. It is our position that ~4C rate is the target MAX for Hyperion or A123 LiFe, as of this writing. Consult battery maker documentation for other LiFePO4 types.

**NiCd and NiMH:** Set BATT TYPE from MEMORY MODE screen as we did before in the LiPo example. Consult the battery manufacturer's documentation to determine the proper settings for VOLTAGE, CAPACITY, and CHG CURRENT.

In addition to the charge settings we have already seen in LiPo Mode, three additional settings exist for NiCd and NiMH battery types. These are essentially "expert" settings, and should be left at defaults unless you know why you want to change them:
***PEAK SENS*** (peak sensitivity – delta V) – default for NiCd is 7mV/C and NiMH is 5mV/C
***TRICKLE*** – sets a low current at which the charger will continue to charge the pack AFTER normal charge is ended
***PEAK DELAY*** – Short interval after peak is detected during which the charger will continue to charge before terminating

**STARTING CHARGE / SELECTING CHARGE TYPE:** After setting *MEMORY MODE* charge parameters, holding down **ENTER** takes you to a Sub-Menu with three options for NiCd/NiMH charge type. Press **ENTER** once to start the current setting flashing, and use **DOWN** key to scroll through the three choices. Hold down the **START** button after your selection to start charging.

**AUTOMATIC** – Essentially ignores your setting for CURRENT, but charges at rate determined by the internal resistance of the battery pack. Especially useful when you don't know what settings you should make due to lack of documentation.
**LINEAR** – Charges at whatever rate you have selected from start to finish (if the charger detects no problem with settings).
**NORMAL** – Charges according to your RATE setting but uses an intelligent algorithm to alter current as needed during charge.

**Lead Acid Batteries:** Set Pb for BATT TYPE, correct voltage at the BATT VOLTS screen and the Ah at the BATT CAPACITY screen, and amperage at the CHG CURRENT screen. Change CHARGE VOLTS if required for your battery type. Consult the battery manufacturer's documentation to determine these settings. FLOAT VOLTAGE maintains the battery at the pre-set voltage after normal charge is finished. FLOAT VOLTAGE will be applied only until the SAFETY TIMER setting has elapsed. If you want to maintain your PB battery at FLOAT VOLTAGE setting indefinitely, turn SAFETY TIMER to OFF.

## *TCS Feature* (Terminal Capacity Selection % for Lithium battery types)

TCS has two settings: TCS CAPACITY %, and TCS END ACTION.
* The TCS CAPACITY Setting is selected from the MEMORY screen by pressing **UP** button four times (or DOWN seven times). TCS Capacity can be set from 50% to 100% in 5% increments (default is 100%, a full charge). The charger uses your setting for Battery Capacity in addition to sophisticated measurements and calculations to make a close estimate for the currently charged capacity in the pack during charging.
* TCS END ACTION can be set to CONTINUE (default) and STOP. If CONTINUE, when TCS% is reached for settings 50% to 95%, the charger will "beep" 10 times, but continue charging to 100% until stopped. If TCS ACTION is set to STOP, the charger will stop charging at that TCS setting and - if balancing is complete – then give COMPLETE (END) Buzzer according to your buzzer settings. (or continue till balanced, then give End buzzer)

There are three good reasons why you might want to charge a Lithium Battery to something less than full capacity:
* The first is for long-term storage. Lithium batteries are best stored after charging to 50%~60% of nominal capacity. However, rather than using TCS for this goal, it is easier and better to always use the STORE MODE function. STORE MODE automatically charges or discharges as needed to reach 60% TCS, then stops.
* The second aim is to get more flight time in during a typical day at the field, by stopping the charge when the battery is 90% to 95% full, for example. Due to the CC/CV method by which LiPo are charged, charging the last few mAh back into the pack takes a LOT more time than the first few mAh did… So if you want to get in the air ASAP, and don't mind a shorter flight then set TCS at 90%~95% could save you a good bit of charge time. In this case we suggest END ACTION setting of CONTINUE, that way the charger will sound 10 beeps when TCS is reached, so you can stop charging and fly. If you don't catch the warning, the charger will continue to charge to full capacity, as a safety measure in case you have forgotten that TCS is set below 100%.
* The third possibility is that evidence suggests that charging to 90%~95% can increase battery cycle life, compared to 100% charges. So in this case set TCS ACTION to STOP.

## **TVC Function** (Terminal Voltage Control per each memory slot, LIPO and LIFE)

The TVC function allows adjustment of final CHARGE voltage for LIPO and LIFE battery types for each memory position:
+0mV (default, therefore no change. Lipo=4.200V terminal, LIFE=3.600V terminal)
+5mV to +80mV (5mV steps, so LIPO for example terminates at 4.205V~4.280V)
-5mV to -20mV (5mV steps, so LIPO for example terminates at 4.195V~4.180V)

The TVC Function is found in every memory slot for Lipo and Life, below TCS ACTION setting screen. Note that the TCV settings are RETAINED, like other Memory settings, when the charger is powered off. Be SURE that this setting is correct before using any LIPO or LIFE memory slot (Default TVC=0mV strongly recommended).

Note: After confirming CELL COUNT and START for LIPO/LIFE charging, if TVC setting is not default, current TVC setting will be shown for a few seconds before the charger begins the charge. Be sure to note the displayed TVC setting at this time, and STOP the charge to reset TVC to default whenever so desired.

**Uses for TVC FUNCTION:**
**-5mV to -20mV:** Reducing Terminal Voltage should only be done in case MEASURED cell voltage at your battery pack (with quality digital voltmeter) shows Terminal voltage exceeding 4.2V for Lipo (or default 3.6V for LIFE/A123 types). This essentially acts as a calibration function, and should normally be unneeded when using EOS standard, supplied output leads and balance harnesses. However, if you have made your own longer harnesses, the additional length in leads creates the possibility of extra induced resistance, and therefore a reading at the charger lower than is actually found at the battery. This could cause an over-voltage charge. If you find terminal voltage over 4.2V/cell for any LIPO cell, reduce TVC setting on each memory position until your MEASURED max cell voltage (at battery) is at 4.2V or lower if LIPO, or 3.6V or lower if LIFE.
**+5mV to +80mV:** Ability to set terminal voltage above defaults is only at the request of competition car, boat, and aircraft users, and only if the race sanctioning body allows terminal voltage for Lipo above 4.2V, or LIFE(A123) above 3.6V.
No LIPO battery maker or seller recommends or allows Terminal Voltage to be set higher than 4.200V, to our knowledge.

Hyperion does not recommend or allow G3 Lipo Terminal Voltage to be set higher than 4.200V. Therefore any + setting above 0mV VOIDS your WARRANTY for your LIPO battery pack. Whenever ALL cells in a pack exhibit puffing, over-voltage charging (or severe over-discharge) is indicated and warranty will not be honored.
**WARNING!** By setting the TVC to any POSITIVE SETTING above 0mV, you **ACCEPT ALL RESPONSIBILITY** for Damage to your battery, Fire, Injury, and any other Loss which may result. **If you do not agree to accept all risk, DO NOT OPERATE YOUR CHARGER UNLESS ALL MEMORY POSITIONS ARE SET TO DEFAULT 0mV TVC position**! Furthermore, it is your responsibility to insure that no other person uses your charger if TVC is set to greater than +0mV, and to reset ALL memory positions to TVC 0mV default before selling your charger or giving it to others.
**Positive settings** (+5mV or higher) may be desired by racers looking for competitive advantage, and therefore +TVC has been demanded as a feature by racers. However, it is the official position of Hyperion that Competition Sanctioning Bodies are irresponsible in allowing over-voltage charging via their rulebooks, and therefore that both users and their sanctioning bodies are FULLY responsible for any Loss, Damage, or Injury that may occur due to over-voltage charging of batteries. Let's say it again: If you want to use Positive TVC settings, you may make that choice. But **ONLY** if you personally deem it desirable, **AND** you are taking **FULL RESPONSIBILITY** for **any** and **all results** which may arise. We encourage you to petition your sanctioning body to stop allowing LIPO terminal voltages in excess of 4.200V, which are both potentially unsafe and without significant benefit, we believe.

NOTE: PB (lead-acid) CHARGE also allows a TVC-like setting (CHARGE VOLTS). In general, PB should be charged at 14.4V setting. However, the Type of battery (wet vs gel vs agm, etc) and ambient temperature may dictate a lower or higher charger voltage. Consult your PB battery maker for advice, and use the CHARGE VOLTS setting at your own risk. If you have no information on TYPE of PB battery you are charging, use 14.0V CHARGE VOLTS setting.

### *Lithium Care*
To maximize your investment in Lithium Battery packs, do the following:
* ALWAYS Store your packs at 60%~70% capacity. After a day of flying, use STORE Mode to achieve this. It is especially harmful to store lithium packs fully charged, and should be avoided for more than a few hours at most.
* NEVER discharge cells beyond 90% of capacity (plan for 80% max). NEVER fully discharge lithium packs.
* STORE your packs in a cool, relatively dry location.

See http://media.hyperion.hk/dn/g3lipo for full details on best care practices for your valuable Lipo batteries.

**LIPO MAX C –** Under USER SETUP menu you will find a setting to allow setting of Maximum "C" charge rate for Lithium Polymer (3.7v/cell type) batteries, with options of 1C to 5C (2C is Default). Note that MAX C **attainable** will depend on the Amps Max and Watt Max rating of your charger, and pack capacity/voltage.

**NOTE:** It is entirely YOUR responsibility to determine the SAFE Max C for your LiPo pack.
**HYPERION original LCL, LCX, LVX, LVZ** types, **2C** max charge rate.
**HYPERION GENERATION 3 25C/35C/45C** packs, **6C** max charge rate
**HYPERION GENERATION3 5C Rx** packs, **4C** max charge rate (20C LiFe Rx packs = 5C max charge)
**HYPERION SWIFT G3 CAR PACKS - 6C** max charge rate
(ALL Hyperion G3 LIPO packs ever produced support 6C rate, regardless of 2C or 5C charge cautions appearing on early packaging)

If using other than Hyperion lithium packs, consult your battery's documentation for allowed C rates, before exceeding 1C charge rate. **If you don't know the allowed max CHARGE rate for your pack, never exceed 1C rates.**

## Net/Duo FAQ

*** The discharge function** is supposed to be 10A Max (5A for NET3-AD), but when I discharged my pack I got less current. Why?
Both charge and discharge functions are limited by both watts and amperage; **whichever comes first**.
Charge: 180W and 15A maxes per port (DUO3)
Discharge: 50W and 10A maxes per port (DUO 3)
- If you are **discharging** a pack which starts at 10V, for example, the initial max current(A) would be: 50W/10V=5A (note that as the battery voltage drops during discharge, current will rise)
- If **charging** a pack which starts at 10V, then max current would be: 180W/10V=18A. BUT current is limited to 15A, so the max you get will be 15A, since the current limit is reached before wattage limit…

NOTE ALSO: Lithium batteries use CC/CV charge curves, so current will always fall as the battery becomes more charged.

*** Why does the charger not give the END buzzer** (or FLAT CHECK error), even though the pack has been attached for a long time? (I have checked and buzzer is set ON)
- LIPO/LIFE: Most likely, you have set a charge rate lower than 1C, and the charger cannot terminate CC/CV as required current at that point is too low. Assuming your battery is of decent quality and condition (if not, do NOT charge it!) there is NO reason to charge at rates below 1C. Charge again at 1C and observe results. Note also that END buzzer will NOT sound until the charger achieves target cell balance. For badly out-of-balance packs or large capacity packs, this could take up to an hour.
- NiCd/NiMH: Same answer as Lipo/LifePO4 above (for a different reason). Try charging at a higher rate. We have found that many NiMH packs on the market today are poorly made, and do not signal delta-v (indicating end charge) properly when charged at low rates, and sometimes even at higher rates. Try setting delta-v in your charger menu to a lower value. Try charging at a higher rate (check battery for over-temp!). If nothing works, get a pack of cells from a known quality brand (Sanyo, GP, etc) and test your charger.

*** Why do I see "0" current flowing** during charge at regular intervals? Is it a "Pulse" charger?
No, the charger simply pauses charging at intervals in order to make extremely accurate readings of cell/pack condition.

## *Troubleshooting*

(1) Ensure that the battery you are trying to charge and the settings on the charger match. Battery type (such as NiMH or LiPo), battery capacity, number of cells (charge voltage), and charge rate must all be correct.

(2) Check that the input cable and output cables:
*Have proper connectors and are in good condition *Are not frayed, worn, cut, or damaged
*Are the proper gauge (output 2.5mm, 14ga) *Are proper length <= 30cm (12") on output side

(3) Attach the charger input connectors to a 12V automotive battery that is in good condition and fully charged. Wiggle the terminal clips into the battery posts to insure that you have a good connection. Many charger problems are due to poor quality or inadequate switching AC-DC power supplies, so this test is necessary to eliminate those from the list of suspects.

(4) Try another battery for charging. If the RC battery is in poor condition, **over discharged**, or in some other way defective, the charger may correctly refuse to charge it based on safety algorithms.

(5) Try another RC battery type. For example switch to a NiMH battery if you are failing to charge Lithium types. Success with one type but failure with another generally indicates that the charger is working properly. The failing battery type is almost certainly in poor condition, wired incorrectly, or the charger may be improperly set.

(6) Contact your dealer with full details and description of the problem, including the type of input power source, RC battery type and cell count, and history of the charger - that is, has the charger been working properly before, or failed from new condition?

(7) I have an OUTPUT CIRCUIT ERROR
* Be sure that your pack balance connector type, polarity, and wiring system matches the multi-adapter attached to the charger.
* Carefully inspect pack connector, balance wire harness and Multi-Adapter for damage, wear, etc. If OK, then:
* Spray all connectors (including the one in charger) with de-oxide contact spray, then insert-remove connectors several times, then spray one last time and re-connect.
* Use a solid DC PS or fully charged CAR battery for Input power (poor power supplies cause MANY problems…)
* Test charger using a lithium battery known to be in good condition.
* Try a different brand battery (preferably with different balance connector and multi-adapter type)

8) My LCD does not light, or lights but no characters are visible.
In most cases this happens when a charger has been dropped, or suffered some heavy vibration. The ribbon cable between LCD unit and charger can become loose. Have your dealer open the charger and re-seat the ribbon cable.

Enjoy the Power!

The Hyperion Team

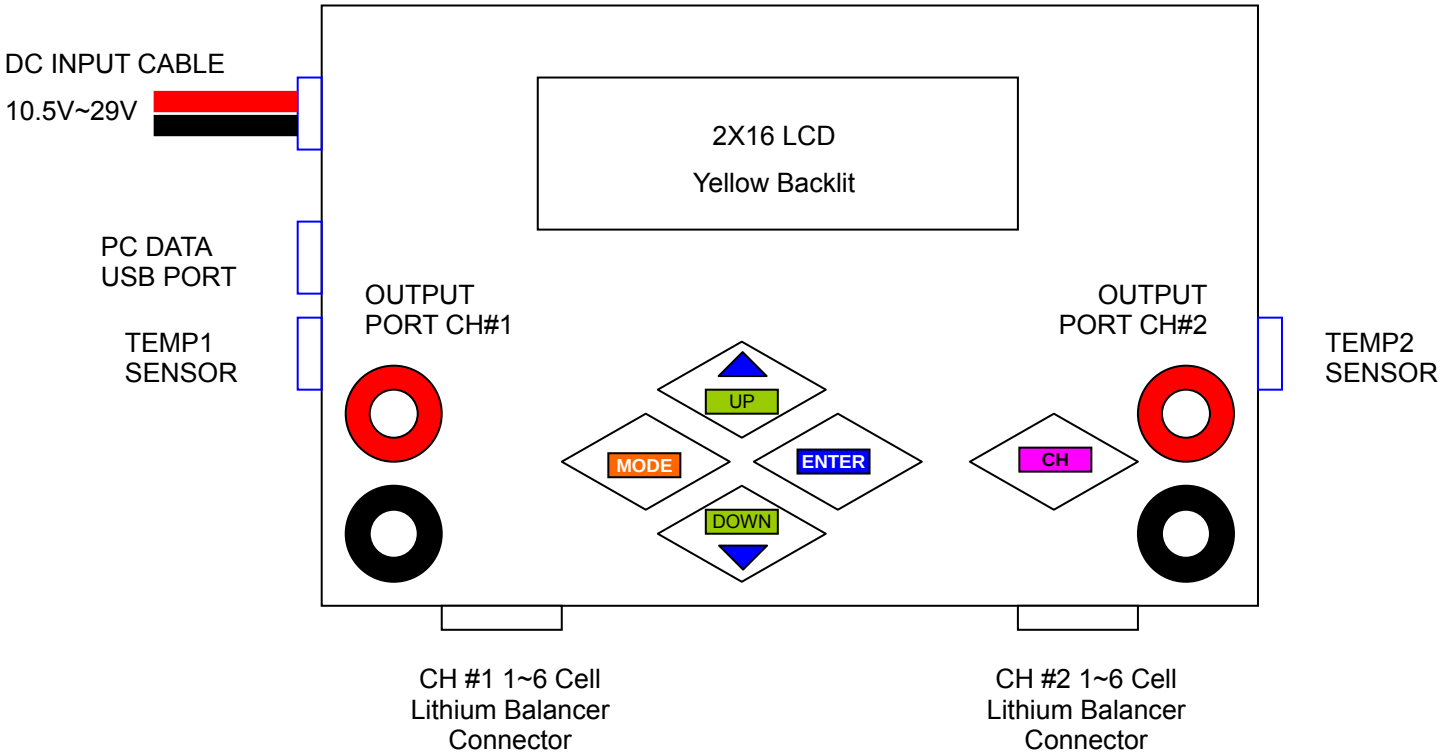
**WARRANTY**
HYPERION Chargers are guaranteed to be free from defects in materials and workmanship for a period of one calendar year from date of purchase. Your selling dealer is your first point of contact for warranty issues. Return postage costs are the responsibility of the user in all cases. You **MUST** submit a copy of original receipt with the charger, and full description of the problem must also be included in the return package.

Damage due to physical shock (dropping on the floor, etc), connection errors due to unauthorized charging configurations, inappropriate power supply [automotive battery charger, etc!], water, moisture, and humidity are specifically NOT covered by warranty. It is well to carefully check your charger and consult your vendor before making a return, as problems in setup, cabling, batteries, or power supply are much more common than defects in the charger.

**IMPORTANT!!** If TVC (Terminal Voltage Control Function) setting greater than 0mV is used at any time for LIPO/LIFE, **NO WARRANTY WILL BE AVAILABLE, nor ANY LIABILITY ACCEPTED for DAMAGE, LOSS, or INJURY.**

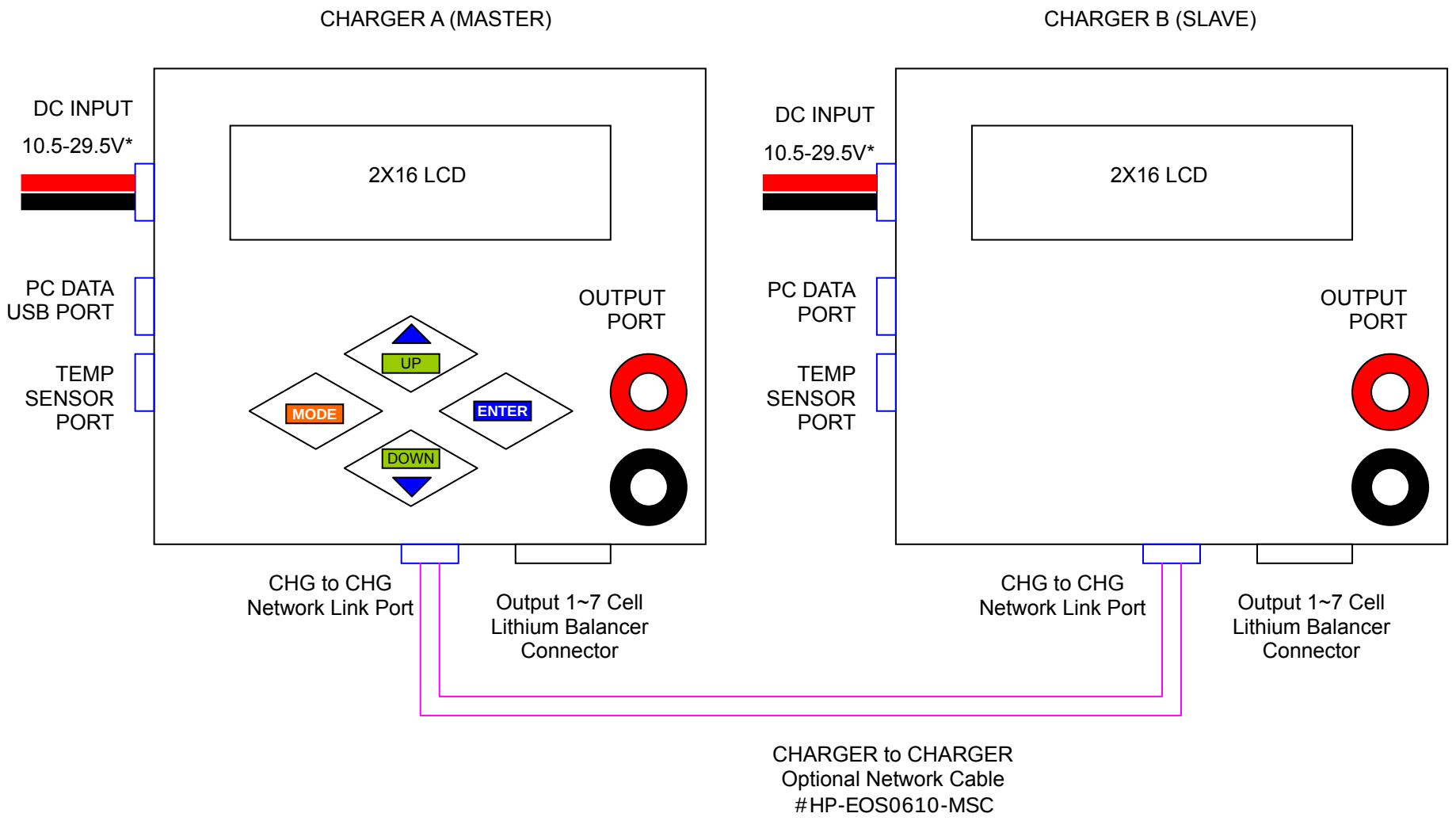
# LAYOUT and OPERATION FLOW CHARTS (v4.6+ firmware versions)

**EOS DUO Series Layout**

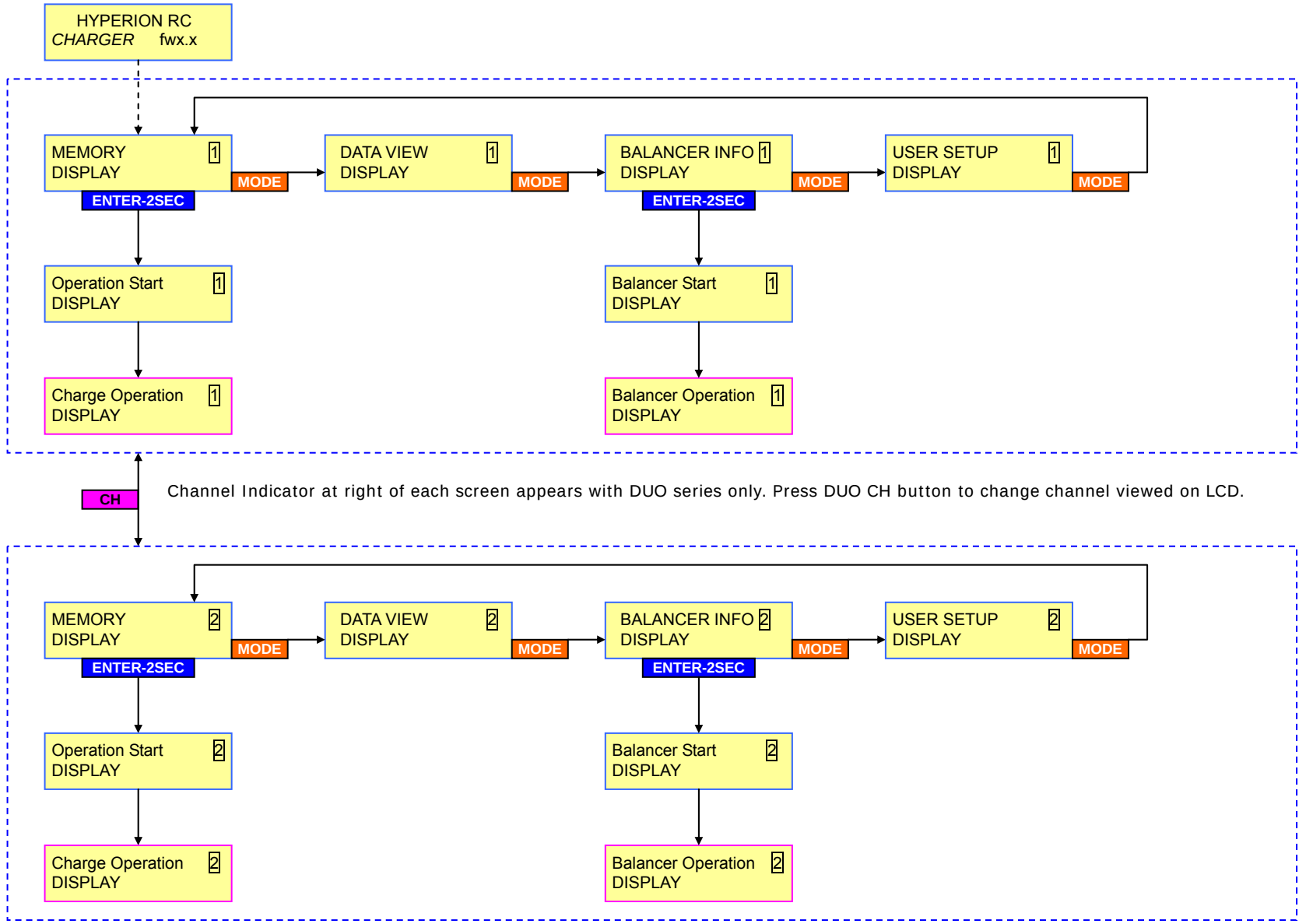


**EOS NET Series Layout** (showing also Networked for SYNC MODE)

* Note that NET3-AD (ac/dc) is 10.5V~15.0V DC input.  All other NET/DUO are 10.5V~29.0V.

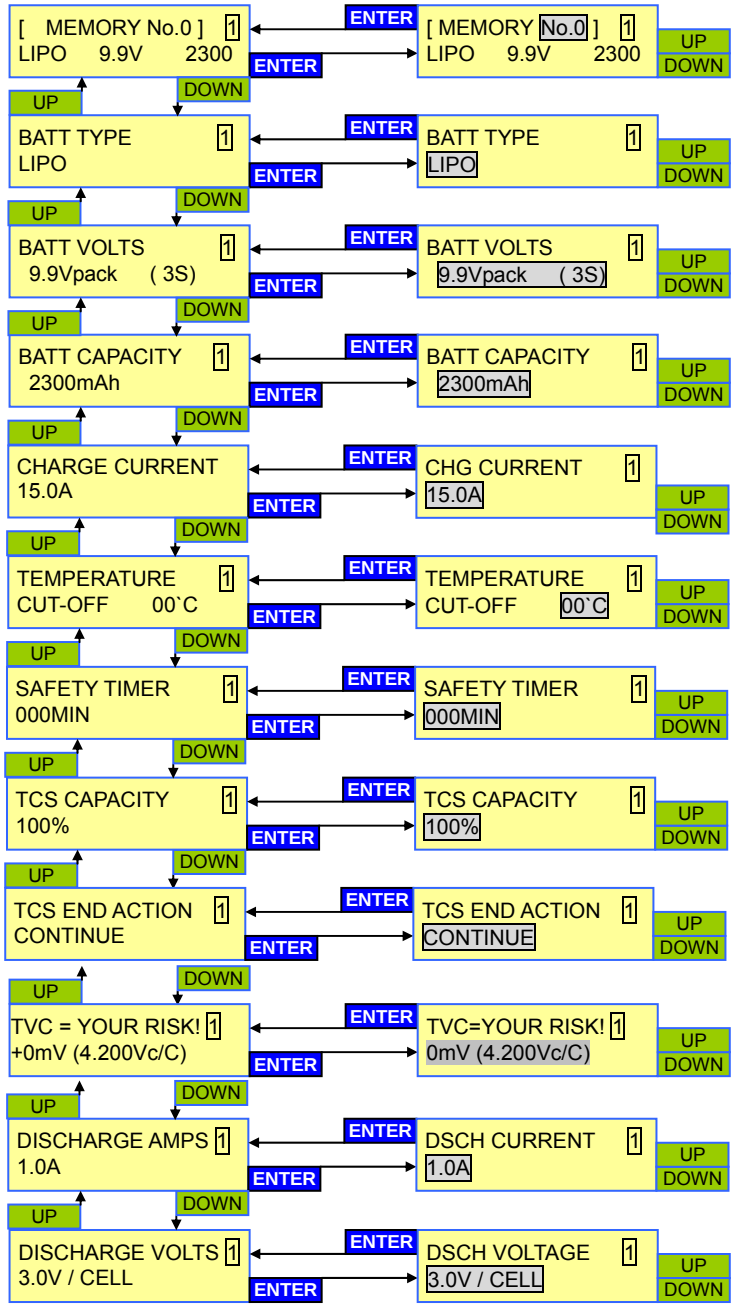


## (1) MAIN MENU FLOW

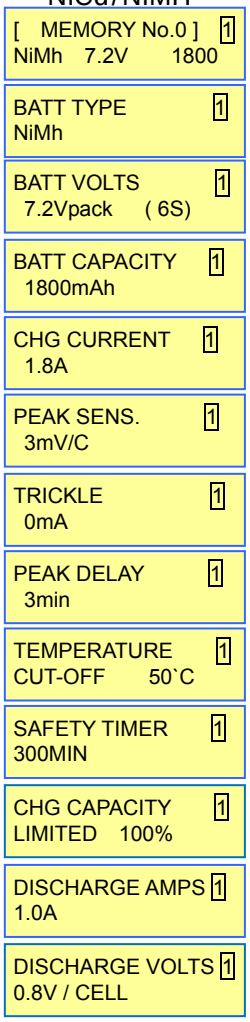


## (2) MEMORY DISPLAY (settings available per each memory slot, depending on battery type)

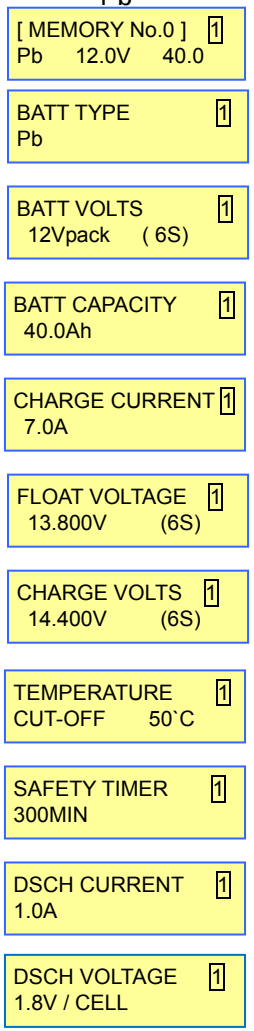
### LiIo/LiPo/LiFe




### NiCd/NiMH

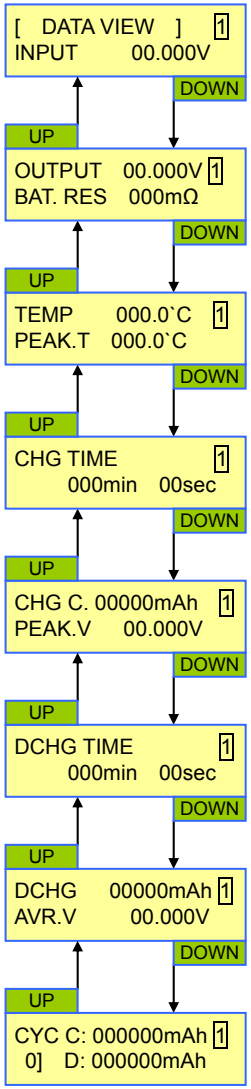



### Pb

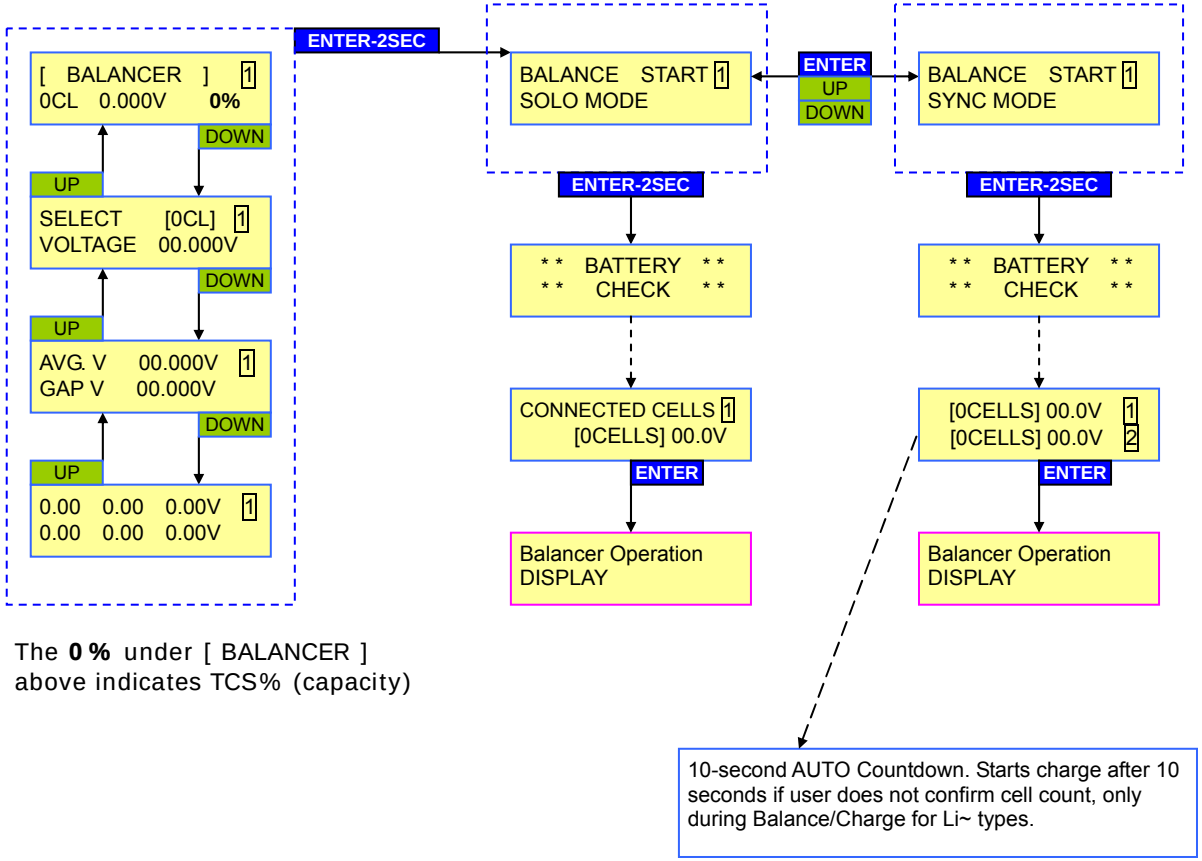



NOTE! NEVER CHANGE TVC SETTING UNLESS YOU ARE AN EXPERT USER, HAVE READ THE DETAILS ON PAGE 12, AND TAKE ALL RISK OF FIRE, DAMAGE, LOSS, or INJURY WHICH MAY RESULT

## (3) DATA VIEW DISPLAY



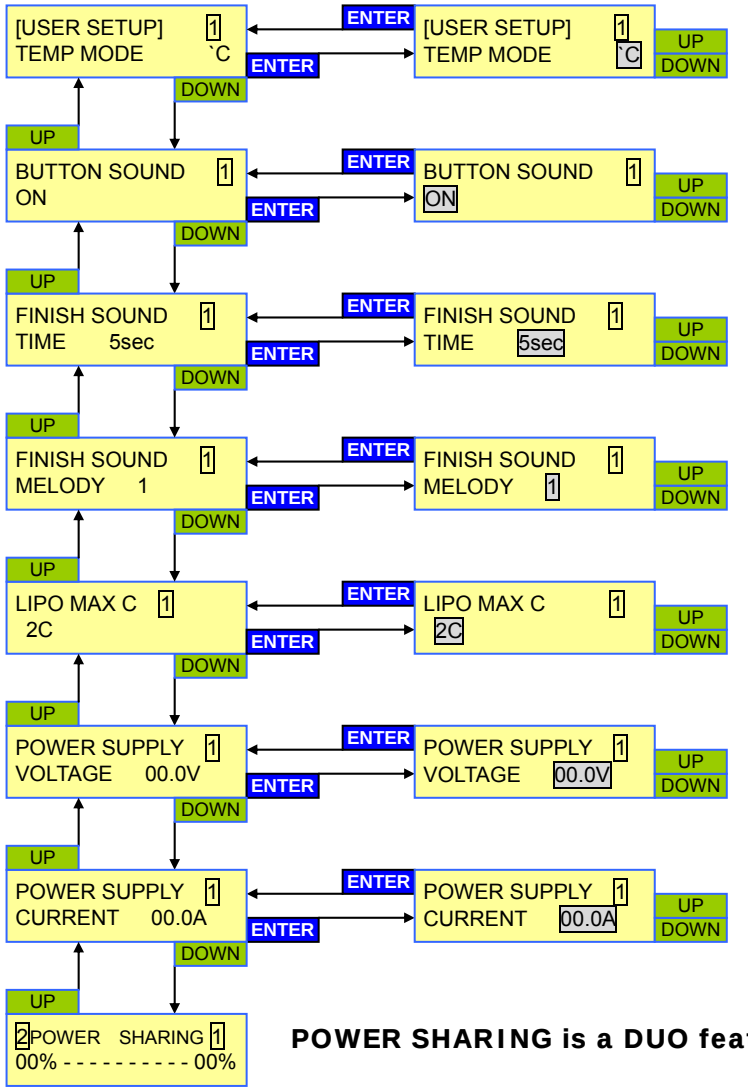

## (4) BALANCE INFORMATION DISPLAY




The **0 %** under [ BALANCER ] above indicates TCS% (capacity)

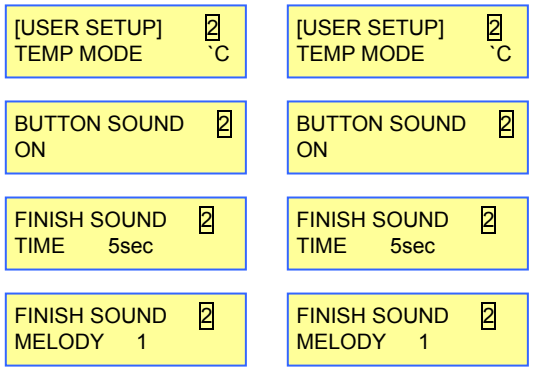
## (5) USER SETUP DISPLAY

CH#1 Global Settings




**POWER SHARING is a DUO feature only**

CH#2 Global Settings

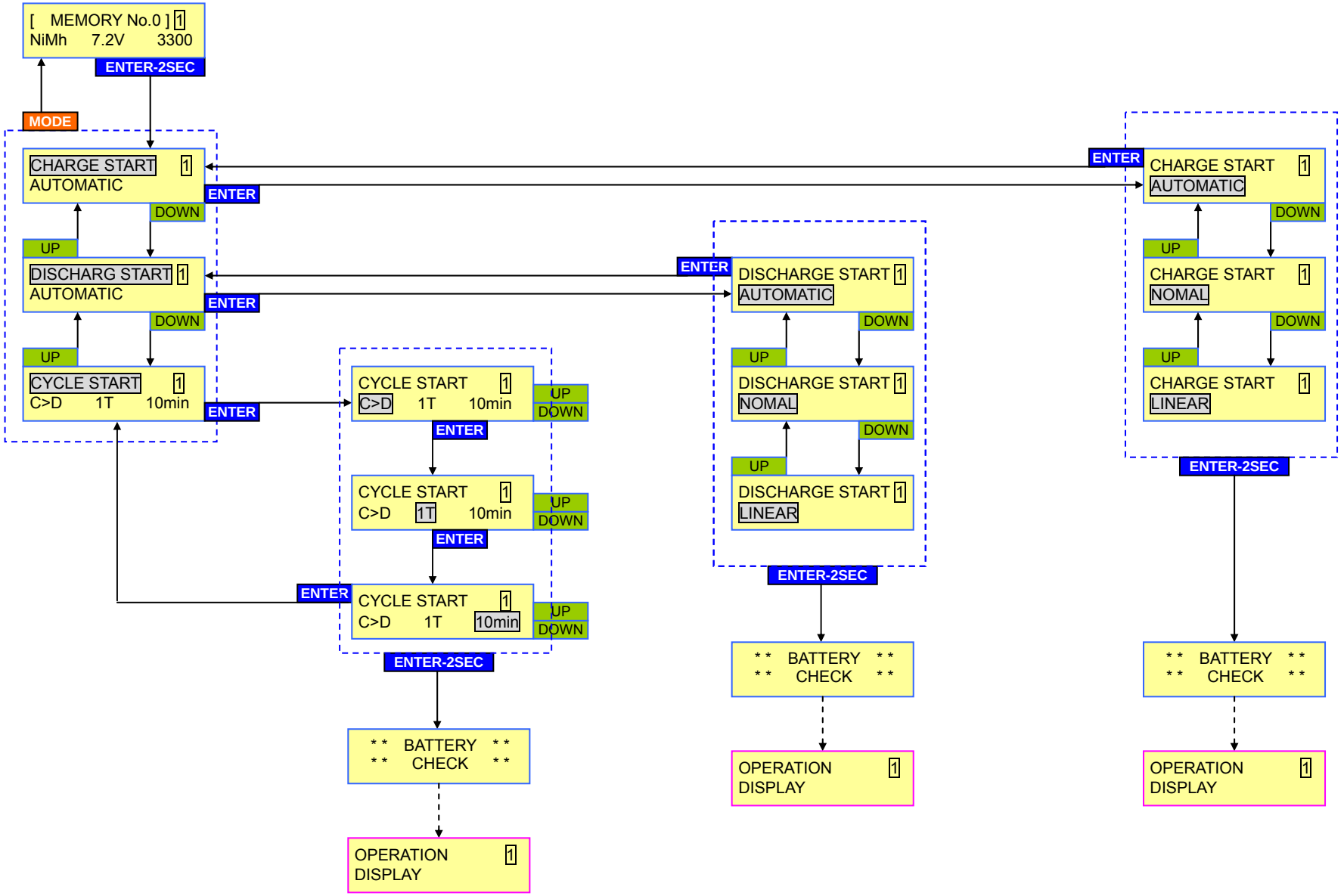



**Lipo "Max C" is set to 2C by default. Select 1C to 5C as desired.**

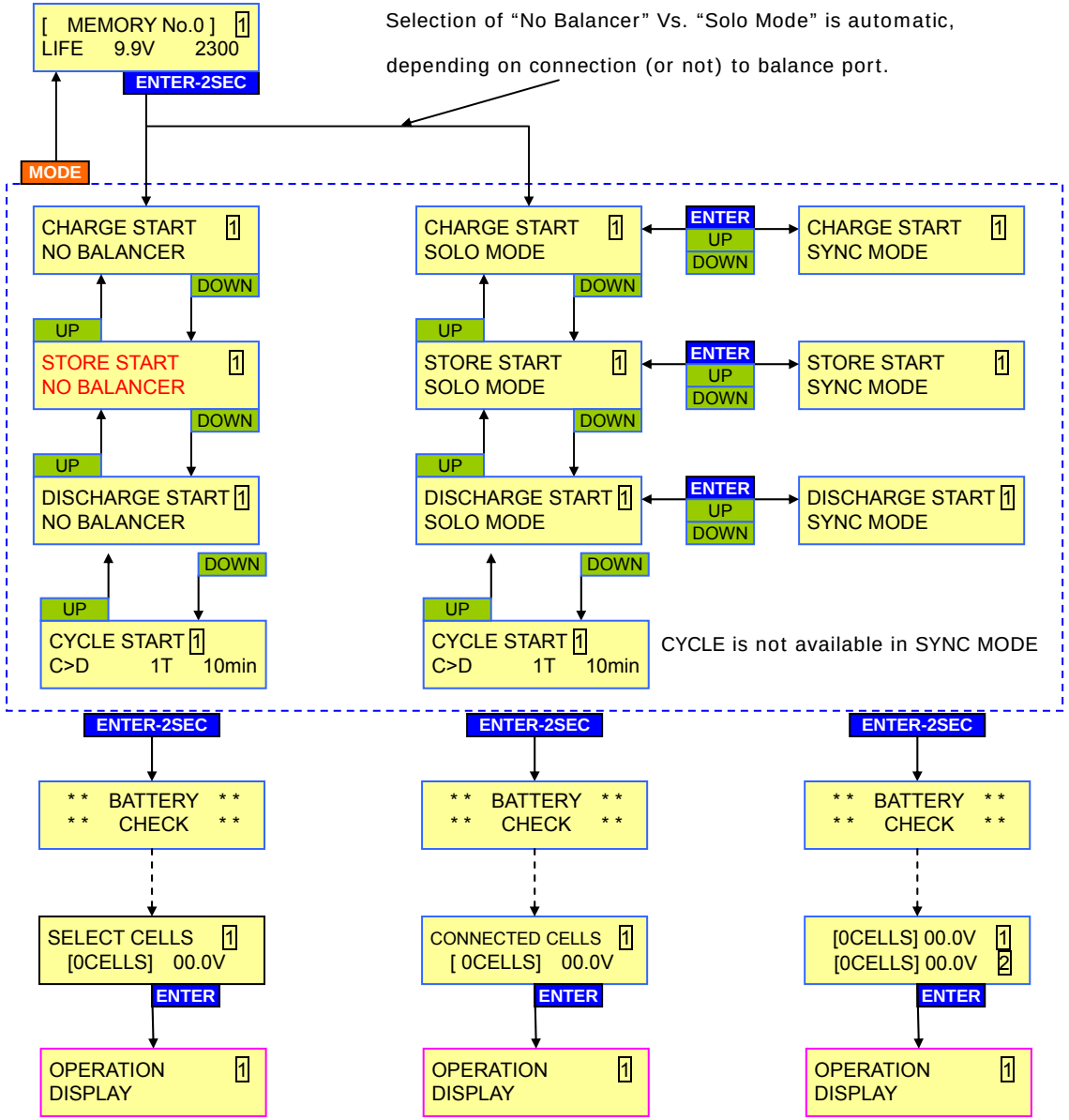
The **PS Load Control** settings above and **LIPO MAX C** are only found under CH#1 menu, but are effective for all memory positions on **both channels** for DUO.

## OPERATIONS START – SETUP & DISPLAY

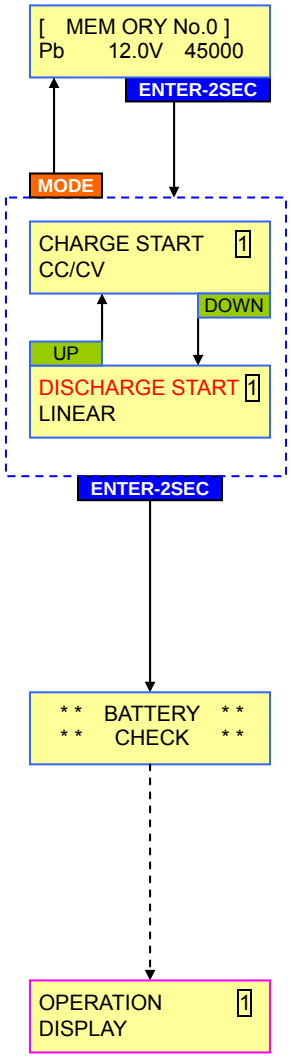
### (6) NiCd / NiMH BATTERY START



## (7) LiIo / LiPo / LiFe) BATTERY START

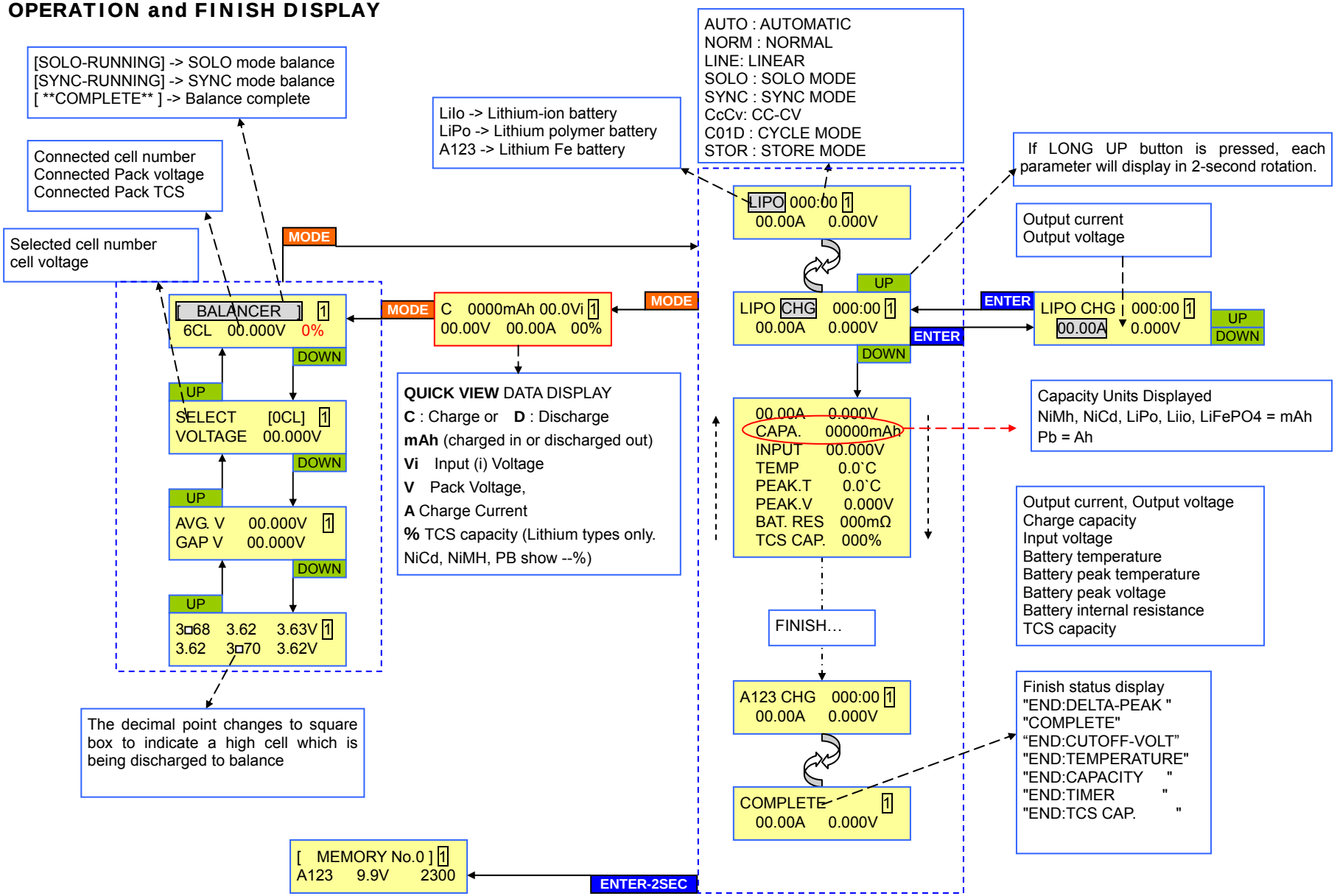



## (8) PB BATTERY START

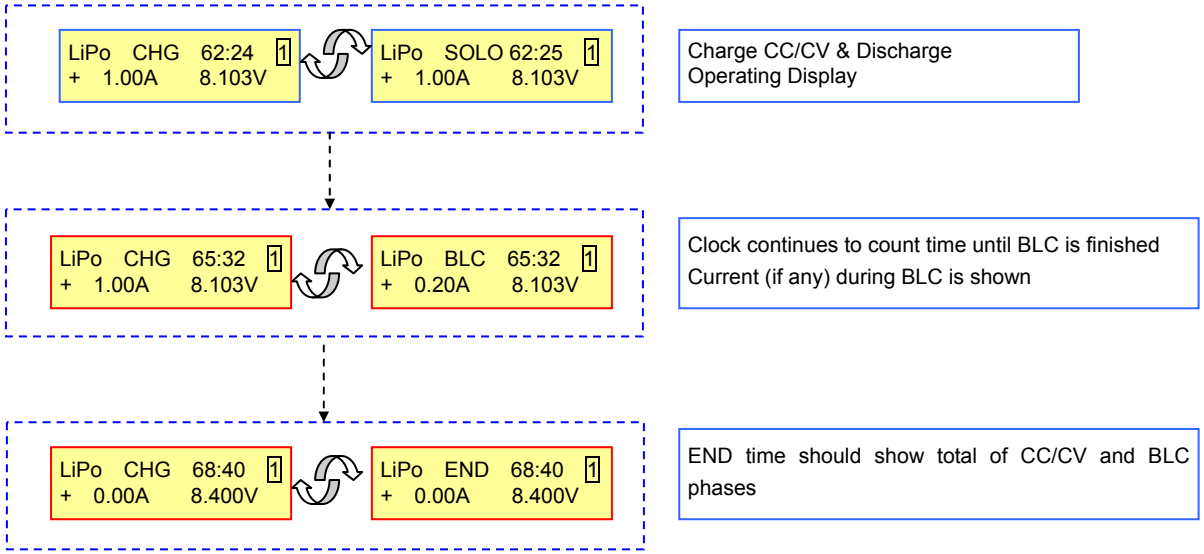



**Note:** STORE Mode only applies to LiIo, LiPo, and LiFe types. Balancer Connection is **required**. If Balancer is NOT connected OUTPUT BATTERY CONNECT ERROR will result.

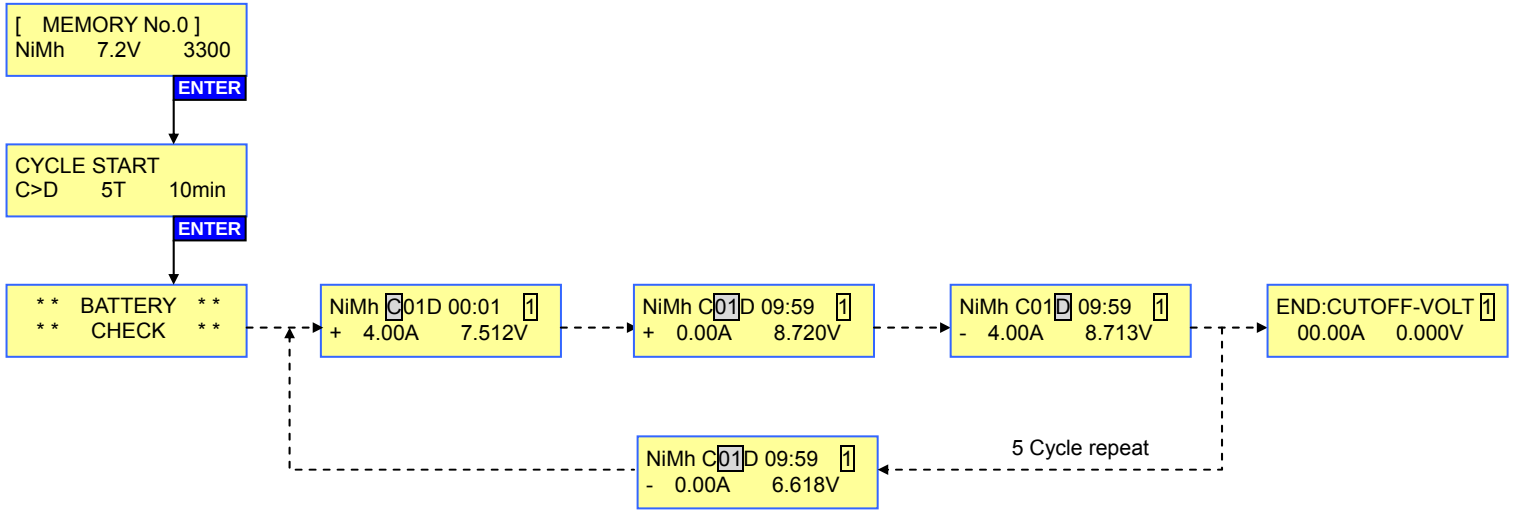
## (9) **OPERATION and FINISH DISPLAY**



## (10) **LiIo / LiPo / LiFePO4 (a123) FINISH DISPLAY**


LiPo CHG 62:24 1
+ 1.00A 8.103V
LiPo SOLO 62:25 1
+ 1.00A 8.103V
Charge CC/CV & Discharge
Operating Display
LiPo CHG 65:32 1
+ 1.00A 8.103V
LiPo BLC 65:32 1
+ 0.20A 8.103V
Clock continues to count time until BLC is finished
Current (if any) during BLC is shown
LiPo CHG 68:40 1
+ 0.00A 8.400V
LiPo END 68:40 1
+ 0.00A 8.400V
END time should show total of CC/CV and BLC phases

## (11) **NiCd / NiMH CYCLE OPERATION DISPLAY**



## ERROR MESSAGES

| | |
|---|---|
| INPUT VOLTAGE ERROR 0.00Vi | When input voltage is below 11.0V or exceeds 28V. |
| OUTPUT BATTERY CONNECT ERROR | When a battery is not connected to the charger's output |
| OUTPUT BATTERY REVERSE POLARITY | Output battery is connected to the output in reverse polarity (switch +/-) |
| OUTPUT BATTERY OPEN CIRCUIT | If the battery becomes disconnected during an operation |
| OUTPUT CIRCUIT ERROR | The output circuit of the charger has a problem. See troubleshooting in text guide. |
| OUTPUT VOLTAGE TOO LOW 0.00V | Output voltage is lower than the selected cells or voltages (check battery specs and condition, or reset charger correctly) |
| OUTPUT VOLTAGE TOO HIGH 0.00V | Output voltage is higher than the selected cells or voltages. |
| TEMPERATURE SENSOR ERROR | The thermal probe is incorrectly connected, or the probe is damaged. |
| BATTERY TEMP TOO LOW 0.00V | The temperature of the battery is too low ( below -10'C at idle mode and 0'C during operation, requires probe attached!). |
| BATTERY TEMP TOO HIGH | Battery temp is too high to be charged! (requires temp probe attached!) |
| INTERNAL TEMP TOO HIGH | Internal temp of the charger has exceeded 125C. Reduce ambient temp, wait, restart. |
| BALANCE VOLTAGE CELL(0) TOO HIGH | A balancing cell's voltage is too high. Possible pack damage or connection error. |
| PAUSE... CHARGER TOO HOT | Charger temperature is too high. Charger will Pause until temp drops |
| SYNC COMMAND ERROR | Problem with wiring, connectors, or other. Clean and inspect as in Troubleshooting section for OUTPUT ERROR |
| FLAT CHECK | NiCd, NiMH only. Charger cannot detect DeltaV to terminate charge. See Troubleshooting section. Try a lower DeltaV setting. |

LIPO BALANCE CONNECTOR MULTI-ADAPTERS

EOS NET/DUO chargers all include Hyperion “HP” multi-adapter(s) and also JST XH types. Other types are available as options for purchase. Be sure to consult the chart to right (or ask your pack maker) to determine which adapter should be used with your battery.

6S Chargers use: **HP-EOSLBA-26**-B**
7S Chargers use: **HP-EOSLBA-7U**-B**

There is also a 6S Adapter for 0615i-DUO3 which fits FMA-brand CellPro Lipo, HP-EOSLBA-26CP-B, available at USA dealers.

| | XH type included | HP(PQ) type included | TP/FP type optional | EH type optional |
|---|---|---|---|---|
| **0615-DUO3 6S >** | **HP-EOSLBA-26XH-B** | **HP-EOSLBA-26HP-B** | **HP-EOSLBA-26TP-B** | **HP-EOSLBA-26EH-B** |
| **NET3 & SDUO3 7S >** | **HP-EOSLBA-7UXH-B** | **HP-EOSLBA-7U-B** | **HP-EOSLBA-7UFP-B** | **HP-EOSLBA-7UEH-B** |
| BATTERY BRANDS WHICH FIT EACH ADAPTER TYPE | ALIGN | HYPERION | THUNDER POWER | KOKAM |
| | DUALSKY | POLYQUEST | FLIGHTPOWER-EVO | GRAUPNER |
| | E-FLIGHT | E-TEC | APEX | ROBBE |
| | ELECTRIFLY | POLY RC | VISLERO | NEU |
| | HEXTRONIC,TURNIGY | XCITE | DANLIONS | APOGEE |
| | ESKY | MAX AMPS | MPX | VAMPOWER |
| | VENOM | TRUE RC | | |
| | AIR THUNDER | IMPULSE | | |
| | KONG THUNDER | | | |
| | GRAYSON POWER | | | |
| | TENERGY | | | |
| | DN POWER | | | |
| | MEGA POWER | | | |
| | ELECTRIC POWER | | | |
| | TURBORIX | | | |
| | ENERGY EC, WOW RC | | | |
| | IMAX | | | |
| | FULLY MAX, FUSION | | | |
| | ZIPPY | | | |